What is claimed is:

1. A method for simulating an electric power network having a plurality of transmission-level buses and connected electrical elements and a plurality of distribution-level buses and connected electrical elements, the method comprising:

integrating models of the distribution-level buses and connected electrical elements with models of the transmission-level buses and connected electrical elements into a single mathematical model; and

simulating an operation of the electric power network with the single mathematical model;

2. A method for analyzing an electric power network having a plurality of transmission-level buses and connected electrical elements and a plurality of distribution-level buses and connected electrical elements, the method comprising:

integrating models of the distribution-level buses and connected electrical elements with models of the transmission-level buses and connected electrical elements into a single mathematical model;

simulating an operation of the electric power network with the single mathematical model; and

assessing under load flow analysis the condition and performance of the simulated electric power network.

3. The method of claim 2, further comprising:

integrating models of theoretical distribution-level real and reactive energy sources connected to one or more of the plurality of distribution-level buses into the single mathematical model; and

observing impacts and effects across the simulated electric power network of the theoretical distribution-level real and reactive energy sources connected on one or more of the plurality of distribution-level buses.

4. The method of claim 2, further comprising:

integrating models of theoretical alternative topologies of the distribution-level portions of the electrical power network into the single mathematical model; and

observing impacts and effects across the simulated electrical power network of the alternative topologies of distribution-level portions of the network.

5. The method of claim 2, further comprising:

integrating additional models of theoretical distribution-level loads into the single mathematical model; and

observing impacts and effects of load growth across the simulated electrical power network due to the addition of theoretical distribution-level loads.

6. The method of claim 2, further comprising:

integrating models of theoretical transmission-level real and reactive energy sources connected to one or more of the plurality of transmission-level buses into the single mathematical model; and

observing impacts and effects across the simulated electric power network of the theoretical transmission-level real and reactive energy sources connected on one or more of the plurality of transmission-level buses.

7. The method of claim 2, further comprising:

integrating models of theoretical alternative topologies of the transmission-level portions of the electrical power network into the single mathematical model; and

observing impacts and effects across the simulated electrical power network of the alternative topologies of transmission-level portions of the network.

8. The method of claim 2, further comprising:

integrating additional models of theoretical transmission-level loads into the single mathematical model; and

observing impacts and effects of load growth across the simulated electrical power network due to the addition of theoretical transmission-level loads.

9. The method of claim 2, wherein the integrating models further comprises:

representing actual distribution-level buses and elements having an actual voltage and an actual topology with corresponding models of buses and elements characterized, at least in part, by representations of the actual voltages and the actual topologies of the distribution-level buses and elements.

10. A method for analyzing performance of a modeled electric power network having a plurality of transmission-level buses and connected electrical elements and a plurality of distribution-level buses and connected electrical elements, the method comprising:

integrating the distribution-level buses and connected electrical elements with the transmission-level buses and connected electrical elements into a single mathematical model;

assessing by load flow analysis a condition and a performance of the modeled electric power network;

adding incremental real and reactive energy sources in locations of the modeled electric power network;

assessing by load-flow analysis the condition and performance of the simulated electric power network with the added incremental real and reactive energy sources;

determining whether the performance of the modeled electric power network is improved as a result of the added real and reactive energy sources;

determining a set of added real and reactive energy sources that yields a greatest improvement in network performance; and

characterizing the set of added real and reactive energy sources as specific distributed energy resources.

11. The method of claim 10, further comprising, quantifying an improvement in performance of the modeled electric power network due to the set of added real and reactive energy sources.

12. The method of claim 10, wherein adding incremental real and reactive energy sources further comprises:

representing the energy sources with models of the energy sources characterized, at least in part, by values of corresponding electric power network actual bus location and actual voltage level;

adding to the mathematical model the models of the energy sources at one of the distribution-level buses and transmission-level buses, wherein the models of real energy sources are added subject to actual limits appropriate for dispatchable demand reductions available on the electric power network, and the real energy sources with reactive energy sources are added subject to actual limits appropriate for generation at load sites within the electric power network.

13. The method of claim 10, wherein determining whether the performance of the modeled electric network is improved as a result of the addition of energy sources comprises:

considering selected characteristics of a reduction of real power losses and reactive power losses, improvement in voltage profile, improvement in voltage stability, improvement of load-serving capability, and avoidance of additions of electric elements connected to the network that would otherwise be required.

14. The method of claim 10, wherein characterizing the additions of real and reactive energy sources comprises:

creating a plurality of mathematical models each having both distribution-level buses and connected electrical elements and transmission-level buses and connected electrical elements under a plurality of network operating conditions;

determining the additions of models of real and reactive energy sources that achieve the greatest improvement in network performance of the modeled network under each set of operating conditions;

characterizing each incremental addition of real or reactive energy sources as a discrete generation project, dispatchable demand response project, or capacitor bank project; and

comparing results achieved under each set of operating conditions to derive model profiles for operation of each discrete added energy source model under each different set of operating conditions

15. A method for analyzing an electric power transmission and distribution network for assessing impacts and benefits of distributed energy resources (DER) for the electric power transmission and distribution network, to provide indication of the extent to which the transmission-level resources and distribution-level resources impact on each other, and of the merits of remedying deficiencies near their network locations, the method comprising:

simulating the electric power transmission and distribution network with a mathematical model as an Energynet in which transmission voltage-level elements and distribution voltage-level elements are integrated within the mathematical model; and

incorporating models of distributed energy resources at a plurality of network locations and voltage levels within the simulated network for analyzing resultant effects.

16. A method for assessing impacts and benefits of distributed energy resources (DER) for an electric power transmission and distribution network, the method comprising:

adding models for real energy sources, reactive energy sources, and combined real and reactive energy sources to modeled network locations in selected combinations; and

evaluating alternative combinations of the additions for their ability to improve selected characteristics of network stability, or voltage security, or reduction of real and reactive power losses, or deferral of conventional network modifications.

17. A method for assessing the potential impacts and benefits of distributed energy resources (DER) for an electric power transmission and distribution network, comprising:

adding to a network model a set of models of real and reactive energy sources for resultant improvement in network performance, independent of other considerations;

characterizing the set of added energy sources as a performance portfolio of individual projects for distributed energy resources, including dispatchable demand reduction, capacitive elements, and power generation; and

evaluating the economic value of improvements in network performance derived from proposed projects based on their similarity to the projects in the performance portfolio.

18. The method of claim 17, further comprising:

identifying the proposed projects that most closely resemble projects in the performance portfolio; and

selectively implementing the identified proposed projects for their beneficial economic or environmental impact and their beneficial performance improvement.

19. A computer readable medium comprising a computer program that when executed in a computer processor implements the steps of:

integrating models of the distribution-level buses and connected electrical elements with models of the transmission-level buses and connected electrical elements into a single mathematical model;

simulating an operation of the electric power network with the single mathematical model; and

calculating the condition and performance of the simulated electric power network.

20. The computer readable medium of claim 19, further comprising a computer program that when executed in a computer processor further implements the steps of:

integrating models of theoretical distribution-level sources of real and reactive energy sources connected to one or more of the plurality of distribution-level buses into the single mathematical model; and

calculating impacts and effects across the simulated electric power network of the theoretical distribution-level real and reactive energy sources connected on one or more the plurality of distribution-level buses.